

TANDY®

Daisy Wheel Printer

DWP-220

OWNER'S MANUAL

CAT. NO. 26-1278



The FCC Wants You to Know . . .

This equipment generates and uses radio frequency energy. If not installed and used properly, that is, in strict accordance with the manufacturer's instructions, it may cause interference to radio and television reception.

It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation.

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This booklet is available from the US Government Printing Office, Washington, DC 20402, Stock No. 004-000-00345-4.

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Introduction

Congratulations for selecting the Tandy Daisy Wheel Printer DWP-220. It's one of the best low-cost, high-quality printers available for micro-computers and it should provide you with years of reliable service.

With a simple change of print wheel cartridges, the DWP-220 can provide print-outs in a variety of font styles.

Other special features of the DWP-220 include:

- Selectable print pitch (characters per inch). The pitch can be specified via the DWP-220 front panel switches or, for maximum flexibility, via program control.
- Tractor Feed (optional/extral) paper handling for fanfold paper, or Friction Feed (standard) paper handling for single-sheet or fanfold paper.
- A Self-Test feature that lets you see if the Printer is operating properly before you begin printing.
- An Out-of-Ribbon Sensor that automatically stops printing when the ribbon runs out.
- Special Line Feeds (1/48", Reverse, etc.) for special printing applications.

and much more!

This manual will:

- Describe the DWP-220 to you.
- Show you how to set it up.
- Describe how to use the Printer in a variety of printing applications.

1 / Description of the DWP-220

When you unpack the DWP-220, be sure the package contains a:

- DWP-220
- Power Cord
- Print Wheel Cartridge
- Ribbon Cartridge
- Silencer

Be sure to unpack the cushions found on the inside of the Printer. You'll have to grasp the front cover with both hands and gently lift it up to gain access to the inside of the Printer.

It's important to become familiar with the Printer before you begin using it. Study the following section carefully before setting up and using the DWP-220.

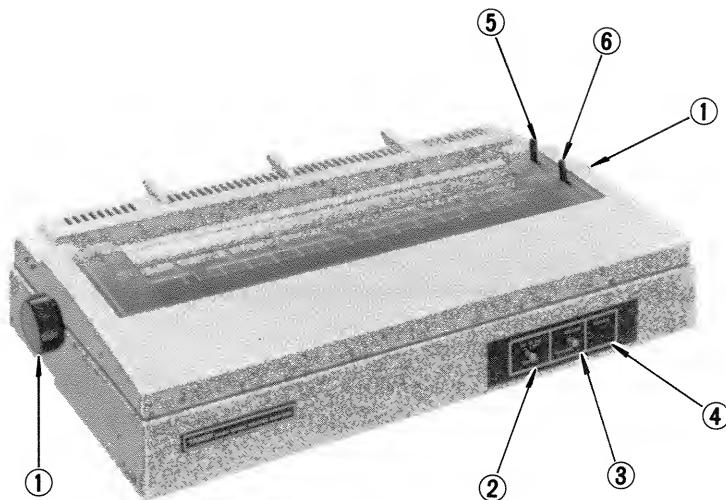


Figure 1. DWP-220 (Front View)

- ① **Paper Advance Knob.** Turn this knob to manually advance the paper.
- ② **PITCH Switch.** To print 10 characters per inch, set this switch to 10; to print 12 characters per inch, set the switch to 12; to print Proportionally Spaced text, set it to PS.
- ③ **ON-LINE/OFF-LINE Switch.** The Printer must be set to ON-LINE before printing can begin. If you have problems during printing, set this switch to OFF-LINE and printing will immediately stop.
- ④ **POWER Indicator.** Lights when the power is on.
- ⑤ **Platen Pressure Lever.** For friction feeding, this lever must be set toward the rear of the Printer. When using the optional/extra Tractor Feed unit, disengage platen pressure by setting the lever toward the front of the Printer.
- ⑥ **Paper Bail Lever.** To apply pressure on the paper, this lever must be set toward the rear of the Printer.

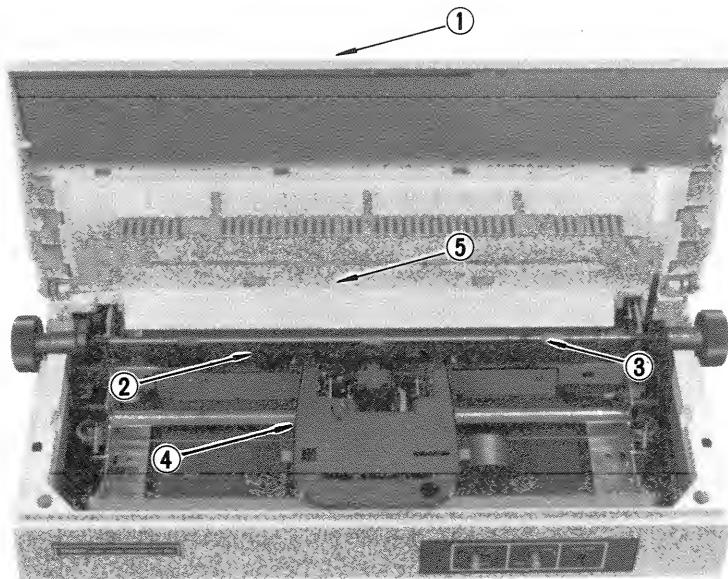


Figure 2. DWP-220 (Inside View)

- ① **Front Cover.** Always use both hands when lifting this cover. Note that the cover must be closed before printing will occur.
- ② **Platen.**
- ③ **Paper Bail.** For the best printing results, the bail should always be against the paper.
- ④ **Carriage.** This mechanism holds the ribbon cartridge and the print wheel cartridge.
- ⑤ **Silencer.** This item is packed separately. Attach it to the protrusion behind the platen to reduce the sound level during printing.

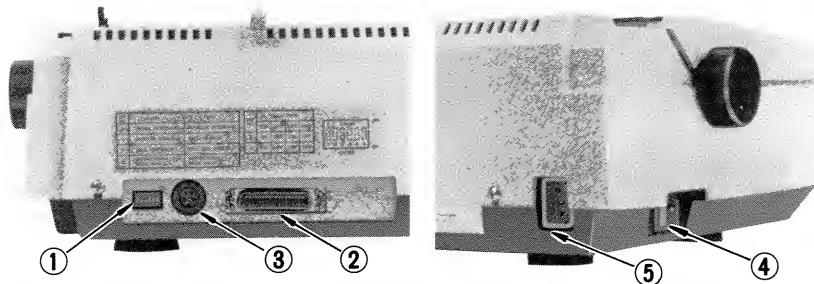


Figure 3. DWP-220 (Rear View)

- ① **Function Selection (DIP) Switches.** These six switches are turned either **ON** or **OFF** to select the Interface, Baud Rate, New Line and Print Direction; switch 5 is used to run the Self-Test. Make sure that each switch is set correctly before power to the Printer is turned on. (See **Function Selection (DIP) Switch Settings.**)
- ② **Parallel Interface Connector.** Connect the cable from your Tandy Computer to this connector.
- ③ **Serial Interface Connector.** Connect the cable from your Tandy Computer to this connector.
- ④ **Power ON/OFF Switch.** Set this switch to **ON** to turn the Printer power on; push the switch in the opposite direction to turn the power **OFF**.
- ⑤ **Power Cord Connector.** Connect one end of the supplied power cord to this connector; use only the supplied cord. Connect the other end of the cord to a grounded wall outlet or to an approved power strip.

2 / Setting Up the DWP-220

When setting up the DWP-220, always be sure you pick a level, sturdy location with plenty of room for easy paper flow.

Print Wheel Cartridge Installation/Removal

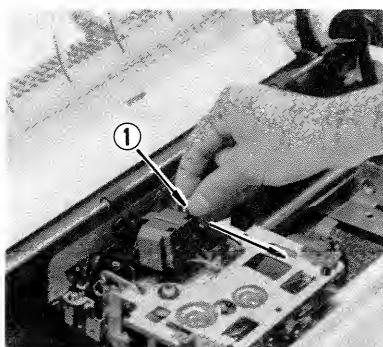
The DWP-220 package includes a Courier 10 print wheel which you will need to install before printing. Radio Shack carries a number of different print wheel cartridges for printing different font styles. These include:

- US ASC Courier 10 (10 pitch) (26-1230)
- US ASC Letter Gothic 12 (12 pitch) (26-1231)
- US ASC Venezia P.S. (Proportional Space) (26-1232)

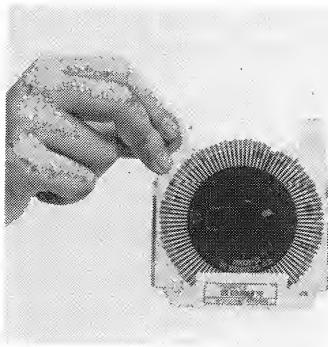
To Install the Print Wheel Cartridge:

Remove the ribbon cartridge if installed.

1. Pull the front carrier lever ① toward you. Figure 4 (1).
2. Hold the portion of the print wheel cartridge shown in Figure 4 (2) with your thumb and forefinger and insert it into the cartridge holder on the front carrier ②. Figure 5 (3)
3. Push the front carrier lever back towards the platen. Figure 5 (4)

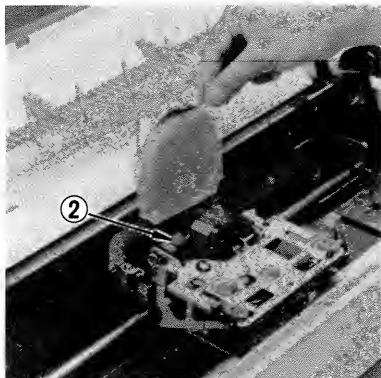


(1)

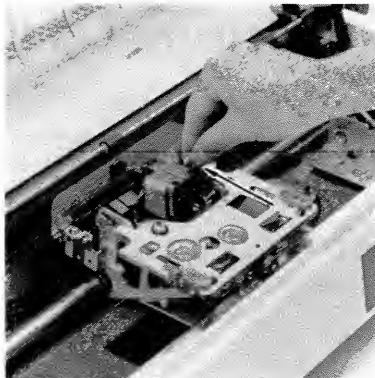


(2)

Figure 4



(3)



(4)

Figure 5

To Remove the Print Wheel Cartridge:

1. Pull the front carrier lever toward you.
2. Grasp the portion of the print wheel cartridge between your thumb and forefinger, as shown in Figure 5, and lift it up.

Ribbon Cartridge Installation/Removal

Radio Shack carries a ribbon cartridge for the DWP-220 which contains a high-quality carbon ribbon (26-1299). You'll find that it's easy to install and remove.

When the carbon ribbon (26-1299) runs out, the Printer detects the end of the ribbon and stops printing.

To Install a Ribbon Cartridge:

1. Before installing the cartridge, remove all slack in the ribbon by turning the green knob ① on the cartridge in the direction indicated by the arrow (counterclockwise).
2. Position the cartridge so that the ribbon slides into position between the print wheel cartridge ② and the plastic card guide ③; the tabs on the cartridge should line up with the green claws ④ on the carriage.

3. Press down on the cartridge and snap it into place.
4. Turn the green knob ① on the cartridge 1/4 to 1/2 turn counter-clockwise until any additional slack in the ribbon has been removed.

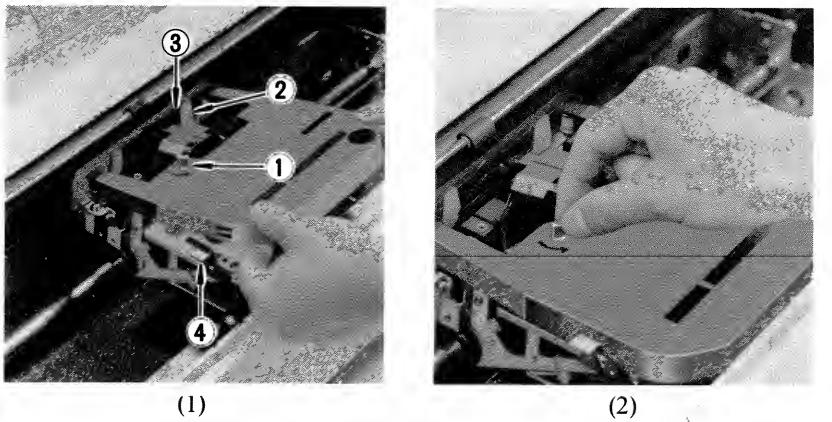
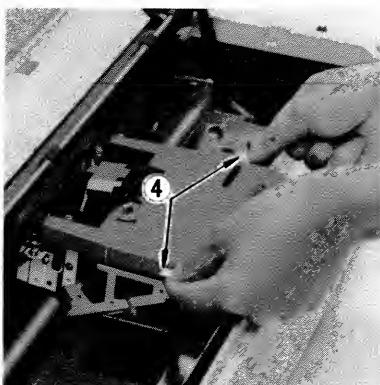


Figure 6

To Remove a Ribbon Cartridge:

1. Gently press the green carriage claws ④ away from the cartridge tabs.
2. Lift up on the cartridge. Be careful not to catch the ribbon on the print wheel.



Paper Loading

You can use either fanfold computer paper or single-sheet typewriter paper with the DWP-220.

If you're using fanfold paper, you'll find it most efficient to use the optional/extra DWP-220 Bidirectional Tractor Feed unit (26-1444).

Manual Paper Loading (Friction Feed)

1. Gently pull the paper bail away from the platen.
2. Set the platen pressure lever toward the rear side of the Printer (pressure ON).
3. Insert the paper behind the platen and turn the platen manually (turn the paper advance knob) so that the paper advances past the card guide.
4. Set the platen pressure lever toward the front of the Printer (pressure OFF) so that the paper can move freely back and forth.
5. Align and position the paper at the left margin.
6. Hold the paper in position and move the platen pressure lever back toward the rear side of the Printer (pressure ON). The paper will no longer move freely.
7. Lower the paper bail so that it is against the paper.
8. Position the paper manually to the first line of printing by turning the paper advance knob.

Note: If the Printer runs out of paper, no **out of paper** signal will be sent to the computer; the Printer will continue printing on the platen. If this happens, immediately turn the **ON-LINE/OFF-LINE** switch to **OFF-LINE**; after loading more paper, return this switch to **ON-LINE**.

Function Selection (DIP) Switch Settings

You'll find the DIP switches on the rear side of the Printer. These switches should be set while the power is still OFF because, with the exception of No. 4 and 5, the DIP switches determine the initial status of the Printer following power ON.

The following functions below can be exchanged by the switches.

Table 1

Switch	Function	Switch Setting		
		ON	OFF	Normal*
No. 1	Interface Select	Serial**	Parallel	OFF
No. 4	New Line	CR Only	CR + LF	OFF
No. 5	Self-Test	Self-Test Operation	Disabled	OFF
No. 6	Print Direction	Unidirectional	Bidirectional	OFF

* **Normal** indicates the position of each switch when you first unpack your new DWP-220.

** **Serial** baud rates are selected via switches No.2 and 3. These switches function only when serial interface is selected. Refer to **Setting the DIP Switches** in Chapter 3 for details on setting these serial baud rate switches.

Connecting the DWP-220 to a Power Source

Always be sure the DWP-220 is connected to a grounded wall outlet or grounded approved power strip, such as Radio Shack's Plug-In Power Strip (61-2619) or the Automatic Power Controller (26-1429).

Always use the supplied cord when connecting the DWP-220 to a power source.

1. Plug the female end of the cord into the connector on the rear side of the Printer.
2. Connect the other end of the cord into an approved power source.

Connecting to a Tandy Computer

The DWP-220 can be used with any Tandy computer or data terminal that has parallel interface capabilities. This includes the:

- Model I
- Model II
- Model III
- Model 4
- Model 12
- Model 16
- Model 100
- Model 2000
- DT-1 Data Terminal

Also you can connect the Tandy Color Computer via serial interface. However, before connecting the Printer to a computer, be sure you have the correct cable. Table 2 summarizes the appropriate Radio Shack cables; Table 3 briefly describes the location of the connection points on the Tandy Computers.

Table 2. Printer-to-Computer Cables

Tandy Computer	Cable Cat. No.
Model I/III/4P	26-1401
Model II/12/16/2000/DT-1	26-4401
Model 100	26-1409
Color Computer	26-3020

Table 3. Tandy Computer Connection Locations

Tandy Computer	Location
Model I	Left side of E.I.
Model II/12/16/100/2000/Color Computer/4P	Rear Panel
Model III/4/DT-1	Lower Panel

1. Connect one end of the appropriate cable to the interface connector on the DWP-220.
2. Connect the other end of the cable to your Tandy Computer.

3 / Using the DWP-220

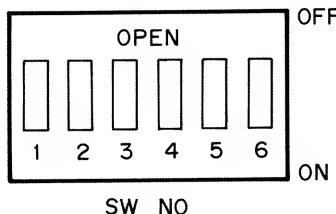
Before using the DWP-220, you should perform the Self-Test to ensure that the Printer is operating properly. Before running the Self-Test, however, you should load wide paper (15") into the Printer. To run the Self-Test:

1. Set the Printer power ON/OFF switch to **ON**.
2. Set the ON-LINE/OFF-LINE switch to **OFF-LINE**.
3. Set the TEST switch (DIP switch No. 5) to **ON**.

To end the Self-Test, set the TEST switch to **OFF**.

Setting the DIP Switches

The DIP switches are **OFF** when set to “**OPEN**”.



Interface Select: No. 1

This switch selects the interface to be used. When set to **OFF**, the **Parallel** interface is selected. When **ON**, the **Serial** interface is selected.

Serial Baud Rate: No. 2 and No. 3

These switches select the serial Baud Rate. For baud rates of 600, 1200, 2400, or 4800, set both switches to the appropriate positions, as indicated in Table 4.

Table 4

Baud Rate	No. 2	No. 3
4800	OFF	OFF
2400	ON	OFF
1200	OFF	ON
600	ON	ON

Note: When you first unpack your DWP-220, both switches (No.2 and 3) are set to the **ON** position.

New Line: No.4

When the Printer receives a control code 13 (the Carriage Return code), this switch selects either Carriage Return with Line Feed or Carriage Return only. Normally, you'll leave this switch in the **OFF** position (CR + LF). For some applications (e.g., when you are using the Printer with an IBM® PC, TANDY 1200, or TANDY 1000, which automatically sends LF along with CR), set it to **ON** (CR only).

You can also select **CR + LF** or **CR** only via software (27 21/27 22 code sequence). However, once you change this function via software, you must turn the Printer power **OFF** to use this DIP switch.

Self-Test: No. 5

Switch No.5 is used to check the Printer functions and is effective only when the Printer is **OFF-LINE**. Set the switch to **ON**, after making sure the front cover is closed, and the self-test operation will begin. If the front cover is opened during the operation, the self-test stops. When set to **OFF**, the Printer is initialized in **OFF-LINE** mode.

The following functions will be tested:

- Selection (print wheel position selection).
- Spacing (one line of H's is printed).
- The revision number of built-in ROM is printed.
- All characters are printed.

Print Direction: No. 6

This switch selects the print direction. When this switch is set to **OFF**, bidirectional printing is selected. When set to **ON**, unidirectional printing is selected. Precise vertical alignment for tables, charts, etc., is achieved via unidirectional printing. However, if you want faster printing, select bidirectional printing.

Setting the Pitch Switch

Be sure to set the PITCH switch (on the front panel) to the position that corresponds with the print wheel cartridge you are using. If you are using a Courier 10 print wheel, for example, set the switch to 10; if you're using a Venezia Proportional Space print wheel, set the switch to PS.

Do not accidentally bump the PITCH switch during printing. Unless you change the pitch via software, the current switch setting remains in effect. (Once you change the pitch via software, you must turn the Printer power **OFF** to use the front panel switch.)

Control Codes and the DWP-220

Before using the DWP-220, consider how the Tandy Computer communicates with the Printer.

All information is sent to the Printer as numbers between 0 and 255 decimal (00-FF hexadecimal). The Printer interprets these numbers according to the American Standard Code for Information Interchange, commonly referred to as the ASCII code. (See **Appendix A** for a list of ASCII codes.) Most numbers (or codes) are printed as letters, numbers, or symbols. However, the numbers 0-31, as well as some special sequences of code numbers, are used to **control** various functions of the Printer. These **Control Codes** allow you to control line feeds, backspacing, underlining, etc.

Sending Control Codes from BASIC

Some Printer functions are activated by a single code, but many require a sequence of two or more codes. Most multiple-code sequences begin with decimal 27 (referred to as the **ESCAPE** code). The ESC code notifies the Printer that a special sequence is on its way. The next code(s) sent determines which Printer function is selected. In BASIC, use **CHR\$** () to send these codes to the Printer.

For instance, set up the DWP-220 as described earlier and enter BASIC in the normal way. Then type the following short program:

```
10 LPRINT CHR$(15); "UNDERLINE" CHR$(14); "NO  
UNDERLINE"
```

and RUN it.

Roll the paper forward and look at the results. The word **UNDERLINE** was underlined and the words **NO UNDERLINE** were not underlined. Why?

The codes **CHR\$(15)** and **CHR\$(14)** are the guilty parties. Take a quick look at Table 5. This chart shows the various code sequences understood by the DWP-220.

Note: If you are using a Tandy Color Computer, read **LPRINT** as **PRINT #2**, in the above example (and everywhere else that **LPRINT** appears in this manual).

Table 5. DWP-220 Control Codes

Codes (Dec)	Codes (Hex)	Function
08 <i>n</i>	08 <i>n</i>	Backspace <i>n</i> /120" (1 < <i>n</i> < 255)
10	0A	Line Feed*
13	0D	Carriage Return with Line Feed**
14	0E	End Underline
15	0F	Start Underline
27 01	1B 01	1/120" Space
27 02	1B 02	2/120" Space
27 03	1B 03	3/120" Space
27 04	1B 04	4/120" Space
27 05	1B 05	5/120" Space
27 06	1B 06	6/120" Space
27 07	1B 07	7/120" Space
27 08	1B 08	8/120" Space
27 09	1B 09	9/120" Space
27 10	1B 0A	Reverse Line Feed*
27 14	1B 0E	12 Pitch Select
27 15	1B 0F	10 Pitch Select
27 17	1B 11	Proportional Space Select
27 21	1B 15	Start Carriage Return Only**
27 22	1B 16	End Carriage Return Only**
27 24	1B 18	Enters External Program Mode***
27 25	1B 19	Exits External Program Mode***
27 26	1B 1A	1/48" Line Feed
27 28	1B 1C	Half Line Feed
27 30	1B 1E	Reverse Half Line Feed
27 31	1B 1F	Bold Print On
27 32	1B 20	Bold Print Off
27 56	1B 38	1/8" Line Feed

* Line Feeds may be sent from machine-language programs, but not from BASIC's **LPRINT** statement. See the Technical Information section of your Tandy Computer owner's manual for details on sending Line Feeds.

** Normally, **CHR\$(13)** causes a Carriage Return plus a Line Feed. However, after a **CHR\$(27); CHR\$(21)** is sent, a **CHR\$(13)** causes a Carriage Return only; **CHR\$(27); CHR\$(22)** causes a return to normal.

*** See **External Program Mode** later in this manual.

Examples of Code Program Lines

```
LPRINT CHR$(8); CHR$(1)
    Backspaces 1/120".
LPRINT CHR$(13)
    Returns carriage with Line Feed.
LPRINT CHR$(27); CHR$(3)
    Moves 3/120" space.
LPRINT CHR$(27); CHR$(14)
    All subsequent characters will be printed in 12 pitch.
LPRINT CHR$(27); CHR$(17)
    All subsequent characters will be printed in Proportional Spac-
    ing.
```

External Program Mode

On some special print wheels, you'll need to *externally* control the:

- Spacing between Proportionally Spaced characters.
- Amount of ribbon feed.
- Printing impression level.

The print wheels that require external programming will be labeled ***Require Special Programming*** on the packaging material. Each print wheel cartridge package will contain external programming code information.

To enter the External Program Mode, send a CHR\$(27); CHR\$(24). Then send a two-byte code for each character or symbol.

- The first byte is the ASCII code for the character.
- The second byte contains the data specifying the printing format (i.e., printing impression level, ribbon feed, and pitch).

Important Note! This must be done for each character during the External Program Mode or an error will occur.

Table 6 describes printing impression levels, Table 7 shows Ribbon Feed, and Table 8 details spacing between Proportionally Spaced characters. Note that these tables list binary values. You'll need to combine the binary values and then convert the binary values (using the Base Conversion Chart in your Tandy Computer owner's or reference manual) to a decimal value. Then send that decimal value to the Printer with CHR\$().

For example, the letter T requires 1/10" spacing, normal ribbon feed and printing impression level 4.

Looking at Table 8, you'll see the 1/10" spacing is binary 0110. Table 7 shows you that normal ribbon feed is binary 1 and Table 6 shows that printing impression level 4 is binary 100. Adding these values together produces a binary value of 01101100 ($0110 + 1 + 100 = 01101100$). By referring to your Base Conversion Chart in a Tandy Computer owner's or reference manual, you'll see that binary 01101100 is equal to decimal 108. Therefore, if you send a CHR\$(84); CHR\$(108) to the DWP-220, the letter T will be printed.

To exit the External Program Mode, send CHR\$(27); CHR\$(25).

The diagram illustrates the relationship between several tables. At the top, a row of bits is shown: D8, D7, D6, D5, D4, D3, D2, D1. Below this is the **PS UNIT set** (Available in PS mode only), which is connected to the **RF set** and the **Hammer set**. The **Hammer set** is connected to the **Hammer Impression Level** table. The **Hammer Impression Level** table is connected to the **Unit Amount (A/60'')** table. The **Unit Amount (A/60'')** table is connected to the **Ribbon Feed Amount** table.

Unit Amount (A/60'')	D8	D7	D6	D5
0 (print without Carriage Movement)	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
10	1	0	1	0
11	1	0	1	1
12	1	1	0	0
13	1	1	0	1
14	1	1	1	0
15	1	1	1	1

Hammer Impression Level	D3	D2	D1
0	0	0	0
1	0	0	1
2	0	1	0
3	0	1	1
4	1	0	0
5	1	0	1
6	1	1	0
(no hammer action)	1	1	1

Ribbon Feed Amount:	D4
Normal	1
Long	0

Table 6

Table 7

Table 8

Example

```

10 LPRINT CHR$(27); CHR$(24) 'ENTERS EXTERNAL PROGRAM
20 LPRINT CHR$(84); CHR$(108); 'PRINT T
30 LPRINT CHR$(97); CHR$(109); 'PRINT a
40 LPRINT CHR$(110); CHR$(108); 'PRINT n
50 LPRINT CHR$(100); CHR$(109); 'PRINT d
60 LPRINT CHR$(121); CHR$(108); 'PRINT g
70 LPRINT CHR$(27); CHR$(25) 'EXITS EXTERNAL PROGRAM

```

Special Functions

When using the DWP-220, you should be aware that there are special functions available.

Auto NL (New Line)

In some cases, the DWP-220 will automatically execute a New Line function (Carriage Return and Line Feed). These cases include:

- When the DWP-220 is set to 10 pitch and the carriage is in the 136th column position.
- When the DWP-220 is set to 12 pitch and the carriage is in the 163rd column position.
- When the DWP-220 is set to Proportional Spacing and the carriage moves to within 8 units (8/60") of the right margin.

REMEMBER! The New Line switch can be set to select either Carriage Return with Line Feed or Carriage Return only. Usually it is set in the **OFF position (CR + NL)**. (When you are using the DWP-220 with an **IBM® PC, TANDY 1200, or TANDY 1000**, set this switch to the **ON position CR only**.) Refer to **Setting the DIP Switches**.

Optimizer

For more efficient printing, the DWP-220 stores certain codes when they are received within 10 milliseconds of each other. These codes include:

- Space
- Backspace
- Line Feed (including New Line)
- Reverse Line Feed
- Half Line Feed
- Half Reverse Line Feed

These codes are stored until either the character codes or function codes are sent within intervals of 10 msec or more. When either of these situations occurs, the stored codes are executed one at a time. For example, when 10 Line Feed codes are entered in less than 10 msec intervals, the DWP-220 will automatically feed 10 lines at once.

4 / Care and Maintenance

Only the parts marked with green require any normal handling/adjustment. Any other maintenance should be performed only by a qualified service technician.

Of course, you can and should perform standard cleaning procedures – just as you would with any office typewriter. Clean the platen, print wheel and other parts with standard typewriter cleaning fluids (use a soft, lint-free cloth).

Some do's and don'ts to assure maximum performance and reliability from your Printer:

DO

Plug power cord into 3-wire grounded outlet.

Position the Printer on a firm, clean, flat surface.

Use only a lint-free cloth to clean the Printer case. Mild detergent solution can be used sparingly.

Ensure that all covers are closed before operating.

Turn off power before making any adjustment.

DON'T

Operate Printer in environments of high dust or dirt content, high temperature or humidity.

Place any objects on any part of the Printer (if anything falls inside the Printer, turn Printer power off and carefully remove the object).

Use alcohol, solvents or harsh cleaning agents on any part of the Printer.

Operate Printer without paper (if paper is less than 15" wide, take care not to print lines too long for the paper).

Troubleshooting

If the Printer fails to operate properly, try to solve the problem as follows:

1. Power lamp does not turn on:
 - A. Check to see that the AC cord is plugged securely into an appropriate power source.
2. No communication with the Tandy Computer:
 - A. Check to see if the interface cable is properly connected.
 - B. Check to see if the **ON-LINE/OFF-LINE** switch is **ON-LINE**.
3. Printer will not print:
 - A. Ensure that the cover is securely closed.
 - B. Check and change the ribbon, if necessary.
 - C. Perform the Self-Test operation to ensure that the Printer is internally capable of printing (see page 14).
 - D. Ensure that the print wheel cartridge is locked into position.
 - E. Check to see if anything has fallen into the mechanism that is physically obstructing the carriage movement.

5 / Specifications

Printing Speed	20 characters per second (typical)
Carriage Return Speed	1200 ms per 13.6 inches
Line Feed Speed	1 inch per second
Printing Pitch	1/10 inch, 1/12 inch, Proportional spacing
Line Feed Pitch	1/6 inch, 1/8 inch, 1/12 inch
Font	100 character positions on Single Daisy Print Wheel
Print Wheel	US ASC Courier 10 (Cat. No. 26-1230) US ASC Letter Gothic 12 (Cat. No. 26-1231) US ASC Venezia P.S. (Cat. No. 26-1232)
Characters per Line	136 characters in 10 pitch mode 163 characters in 12 pitch mode
Print Wheel Life	10 million characters (V-Shaped mono-mold print wheel)
Ribbon Life	Nominal 340,000 characters; may vary according to the text printed (Multi-strike, carbon ribbon)
Interfaces	
Interfaces	Parallel/Serial
Code	Modified ASCII
Parallel Interface Data	8 parallel data and 1 strobe
Serial Interface	
Data Format	Start bit: 1 bit Data bit: 8 bits Stop bit: 1 or 2 bits
Temperature Ranges	
Operating	+41 to +95°F (+5 to +35°C)
Storage	-40 to +158°F (-40 to +70°C)
Relative Humidity	
Operating	20-90% RH (Non condensing)
Storage	5-95% RH (Non condensing)
Paper	
Weight	Total weight: 26 pound/ft ² max. (127.9 grams/m ² max.)
	One ply: 8 pound/ft ² max. (40 grams/m ² max.)
Size	Width: 16.5 inches max. (420 mm max.) Length: 3.33 inches min. (84.7 mm min.)
Ribbon	Multi-strike, carbon ribbon (Cat. No. 26-1299)
Size	6.65" x 24.37" x 13.35" 169 mm x 619 mm x 339 mm (HWD)
Power Requirements	120 VAC, 50/60 Hz, 60 W typical (220/240 VAC, 50 Hz for the units purchased in Europe/Australia)

Optional bidirectional tractor is available (Cat. No. 26-1444).

**Table 9. Fonts, Positions on Print Wheel,
Impression Levels and Proportional Space**

A: Font

B: Position on Print Wheel

C: Impression Level

D: Proportional Space Unit

A	—	,	—	;	m	?	h	b	r	e	t	a	s	v	n	o
B	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
C	0	0	0	2	6	3	4	5	3	4	3	5	3	3	4	4
D	6	5	5	5	7	5	6	6	5	5	4	6	5	6	6	5

A	c	i	p	I	C	u	l	f	*	d	q	y	'	E	S	D
B	10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F
C	4	3	5	3	4	4	3	3	3	5	5	4	1	5	4	5
D	5	4	6	4	6	6	5	4	6	6	6	6	5	6	5	6

A	~	H	O	J	F	|	Q	j	U	R	>	G	V	x	]	K
B	20	21	22	23	24	25	26	27	28	29	2A	2B	2C	2D	2E	2F
C	1	4	5	3	4	3	6	3	4	5	3	5	4	4	3	6
D	5	6	6	4	6	5	6	4	6	6	5	6	6	6	5	6

A	[	%	{	@	/	#	|	%	-	X	+	<	\$	}	—	(
B	30	31	32	33	34	35	36	37	38	39	3A	3B	3C	3D	3E	3F
C	3	5	3	6	3	6	3	6	1	5	2	3	6	3	3	3
D	5	6	5	6	5	6	5	7	5	6	5	5	5	5	6	5

A	£	'	&	1	¢	z	\	8	N	=	Y	L	B	P	6	3
B	40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F
C	5	0	6	3	4	4	3	5	4	3	4	3	6	5	5	4
D	6	5	6	5	5	6	5	5	6	5	6	6	6	6	5	5

A	5	z	W	!	M	9	4	2	0	7	A	T	k	"	1/2	:
B	50	51	52	53	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F
C	4	4	6	2	6	5	4	4	4	4	4	4	4	2	5	1
D	5	5	7	5	7	5	5	5	5	6	6	6	5	5	5	5

A	w	)	g	.												
B	60	61	62	63												
C	5	3	5	0												
D	7	5	6	5												

Appendix A/ ASCII Character Codes

CODE			Char	CODE			Char
DEC.	HEX.	OCT.		DEC.	HEX.	OCT.	
32	20	040	SP	62	3E	076	>
33	21	041	!	63	3F	077	?
34	22	042	"	64	40	100	“
35	23	043	#	65	41	101	A
36	24	044	\$	66	42	102	B
37	25	045	%	67	43	103	C
38	26	046	&	68	44	104	D
39	27	047	'	69	45	105	E
40	28	050	(	70	46	106	F
41	29	051	)	71	47	107	G
42	2A	052	*	72	48	110	H
43	2B	053	+	73	49	111	I
44	2C	054	,	74	4A	112	J
45	2D	055	-	75	4B	113	K
46	2E	056	.	76	4C	114	L
47	2F	057	/	77	4D	115	M
48	30	060	0	78	4E	116	N
49	31	061	1	79	4F	117	O
50	32	062	2	80	50	120	P
51	33	063	3	81	51	121	Q
52	34	064	4	82	52	122	R
53	35	065	5	83	53	123	S
54	36	066	6	84	54	124	T
55	37	067	7	85	55	125	U
56	38	070	8	86	56	126	V
57	39	071	9	87	57	127	W
58	3A	072	:	88	58	130	X
59	3B	073	;	89	59	131	Y
60	3C	074	<	90	5A	132	Z
61	3D	075	=	91	5B	133	[

Printable Characters

The DWP-220 can produce all modified ASCII characters. Here's what they look like:

CODE			Char	CODE			Char
DEC.	HEX.	OCT.		DEC.	HEX.	OCT.	
92	5C	134	\	122	7A	172	z
93	5D	135	]	123	7B	173	{
94	5E	136	^	124	7C	174	|
95	5F	137	—	125	7D	175	}
96	60	140	ˇ	126	7E	176	ˇ
97	61	141	a	163	A3	243	£
98	62	142	b	174	AE	256	1/2
99	63	143	c	184	B8	270	—
100	64	144	d	185	B9	271	%
101	65	145	e	186	BA	272	|
102	66	146	f	222	DE	336	¢
103	67	147	g				
104	68	150	h				
105	69	151	i				
106	6A	152	j				
107	6B	153	k				
108	6C	154	l				
109	6D	155	m				
110	6E	156	n				
111	6F	157	o				
112	70	160	p				
113	71	161	q				
114	72	162	r				
115	73	163	s				
116	74	164	t				
117	75	165	u				
118	76	166	v				
119	77	167	w				
120	78	170	x				
121	79	171	y				

Proportional Character Set Units Per Column

CODE CHAR. WIDTH	32/20 SP	33/21 !	34/22 "	35/23 #	36/24 \$
CODE CHAR. WIDTH	42/2A *	43/2B +	44/2C ,	45/2D -	46/2E .
CODE CHAR. WIDTH	52/34 4	53/35 5	54/36 6	55/37 7	56/38 8
CODE CHAR. WIDTH	62/3E >	63/3F ?	64/40 @	65/41 A	66/42 B
CODE CHAR. WIDTH	72/48 H	73/49 I	74/4A J	75/4B K	76/4C L
CODE CHAR. WIDTH	82/52 R	83/53 S	84/54 T	85/55 U	86/56 V
CODE CHAR. WIDTH	92/5C \	93/5D]	94/5E ^	95/5F —	96/60 `
CODE CHAR. WIDTH	102/66 f	103/67 g	104/68 h	105/69 i	106/6A j
CODE CHAR. WIDTH	112/70 p	113/71 q	114/72 r	115/73 s	116/74 t
CODE CHAR. WIDTH	122/7A z	123/7B {	124/7C |	125/7D }	126/7E ~
CODE CHAR. WIDTH	222/DE ¢				

CODE CHAR. WIDTH	37/25 %	38/26 &	39/27 '	40/28 (	41/29)
CODE CHAR. WIDTH	47/2F /	48/30 0	49/31 1	50/32 2	51/33 3
CODE CHAR. WIDTH	57/39 9	58/3A :	59/3B ;	60/3C <	61/3D =
CODE CHAR. WIDTH	67/43 C	68/44 D	69/45 E	70/46 F	71/47 G
CODE CHAR. WIDTH	77/4D M	78/4E N	79/4F O	80/50 P	81/51 Q
CODE CHAR. WIDTH	87/57 W	88/58 X	89/59 Y	90/5A Z	91/5B [
CODE CHAR. WIDTH	97/61 a	98/62 b	99/63 c	100/64 d	101/65 e
CODE CHAR. WIDTH	107/6B k	108/6C l	109/6D m	110/6E n	111/6F o
CODE CHAR. WIDTH	117/75 u	118/76 v	119/77 w	120/78 x	121/79 y
CODE CHAR. WIDTH	163/A3 £	174/AE 1/2	184/B8 —	185/B9 %	186/BA|

Note: Codes are in Decimal and Hexadecimal (Dec/Hex).

Proportional Character Style Code Chart

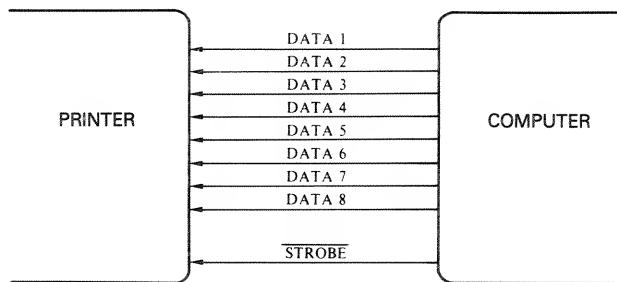
4 UNIT		5 UNIT		6 UNIT		7 UNIT	
J	74/4A	!	33/21	I	73/49	#	35/23
f	102/66	"	34/22	S	83/53	%	37/25
i	105/69	\$	36/24	[	91/5B	&	38/26
j	106/6A	'	39/27	\`	92/5C	*	64/2A
l	108/6C	(	40/28	]	93/5D	aa	64/40
t	116/74	)	41/29	^	94/5E	A	65/41
		+	43/2B	~	96/60	B	66/42
		,	44/2C	c	99/63	C	67/43
		-	45/2D	e	101/65	D	68/44
		.	46/2E	o	111/6F	E	69/45
		/	47/2F	r	114/72	F	70/46
		0	48/30	s	115/73	G	71/47
		1	49/31	z	122/7A	H	72/48
		2	50/32	{	123/7B	K	75/4B
		3	51/33	|	124/7C	L	76/4C
		4	52/34	}	125/7D	N	78/4E
		5	53/35	-	126/7E	O	79/4F
		6	54/36	1/2	174/AE	P	80/50
		7	55/37	|	186/BA	Q	81/51
		8	56/38	¢	222/DE	R	82/52
		9	57/39			T	84/54
		:	58/3A			U	85/55
		;	59/3B			V	86/56
		<	60/3C			X	88/58
		=	61/3D			Y	89/59
		>	62/3E			Z	90/5A
		?	63/3F			—	95/5F
						a	97/61
						b	98/62
						d	100/64

Note: Codes are in Decimal and Hexadecimal (Dec/Hex).

Appendix B/ Interface Descriptions

Parallel Interface

Input Signal System Diagram

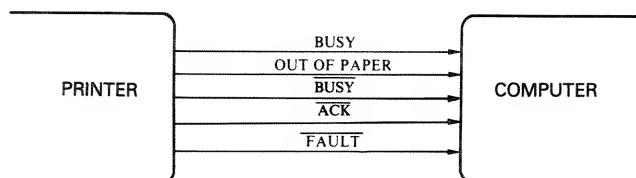


* Ground not shown

Description of Each Input Signal

1. **DATA Lines** (DATA 1 – DATA 8) These DATA lines provide 8 input signals for actuating the Printer. The Printer will ignore any invalid code applied.
2. **STROBE**
A sampling signal for the DATA lines which provide instruction signals for actuating the Printer.

Output Signal System Diagram



* Ground not shown

Description of Each Output Signal

- ***BUSY***

Busy condition:

- 1) Data is in buffer
- 2) Initial state
- 3) Off-line mode
- 4) Error state
- 5) Ribbon fault state
- 6) Cover open state

Ready condition:

- 1) Condition other than one of those listed in 1 through 6 above
- 2) Cover closed state

- ***OUT OF PAPER***

No function. This line is always a “0” signal.

- ***BUSY***

This signal is the logical inverse of BUSY.

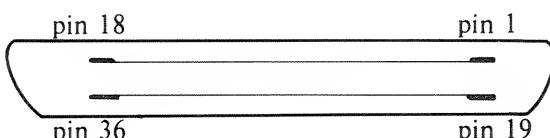
- ***ACK***

This signal indicates the Printer has accepted data from the CPU.

- ***FAULT***

This signal indicates the Printer is in an error state, ribbon fault state, cover open state or off-line state.

Interface Signal Pin Assignments



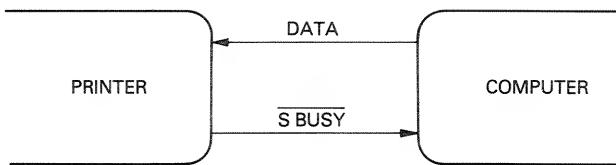
Pin	Signal Name	Pin	Signal Name
1	STROBE	19	GND
2	DATA 1	20	GND
3	DATA 2	21	GND
4	DATA 3	22	GND
5	DATA 4	23	GND
6	DATA 5	24	GND
7	DATA 6	25	GND
8	DATA 7	26	GND
9	DATA 8	27	GND
10	ACK	28	GND
11	BUSY	29	GND
12	OUT OF PAPER	30	GND
13	BUSY	31	N.C.
14	GND	32	FAULT
15	N.C.	33	N.C.
16	GND	34	N.C.
17	GND	35	N.C.
18	+5 VDC	36	N.C.

Note: N.C. pins are actually pulled up to +5 VDC through a 4.7K resistor.

Pin 18 provides +5 VDC to the Tandy Computer (less than 80 mA of current).

Serial Interface

Input/Output Signal System Diagram

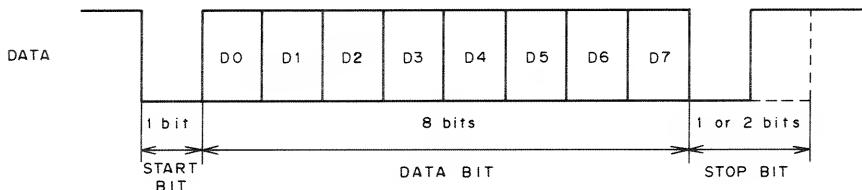


* Ground not shown

Description of Each Signal

1. DATA

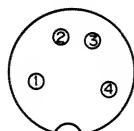
The DATA signal for actuating the Printer is sent from the Computer in the format shown below:



2. S BUSY

This signal is the same as BUSY used in the Parallel Interface. Refer to **Parallel Interface**, under **Output Signal**.

Interface Signal Pin Assignments



Pin	Signal Name
1	N.C
2	S BUSY
3	SG
4	DATA

SG: Signal ground

Appendix C/ Print Samples

US ASC Courier (10 pitch)

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
0123456789

US ASC Letter Gothic (12 pitch)

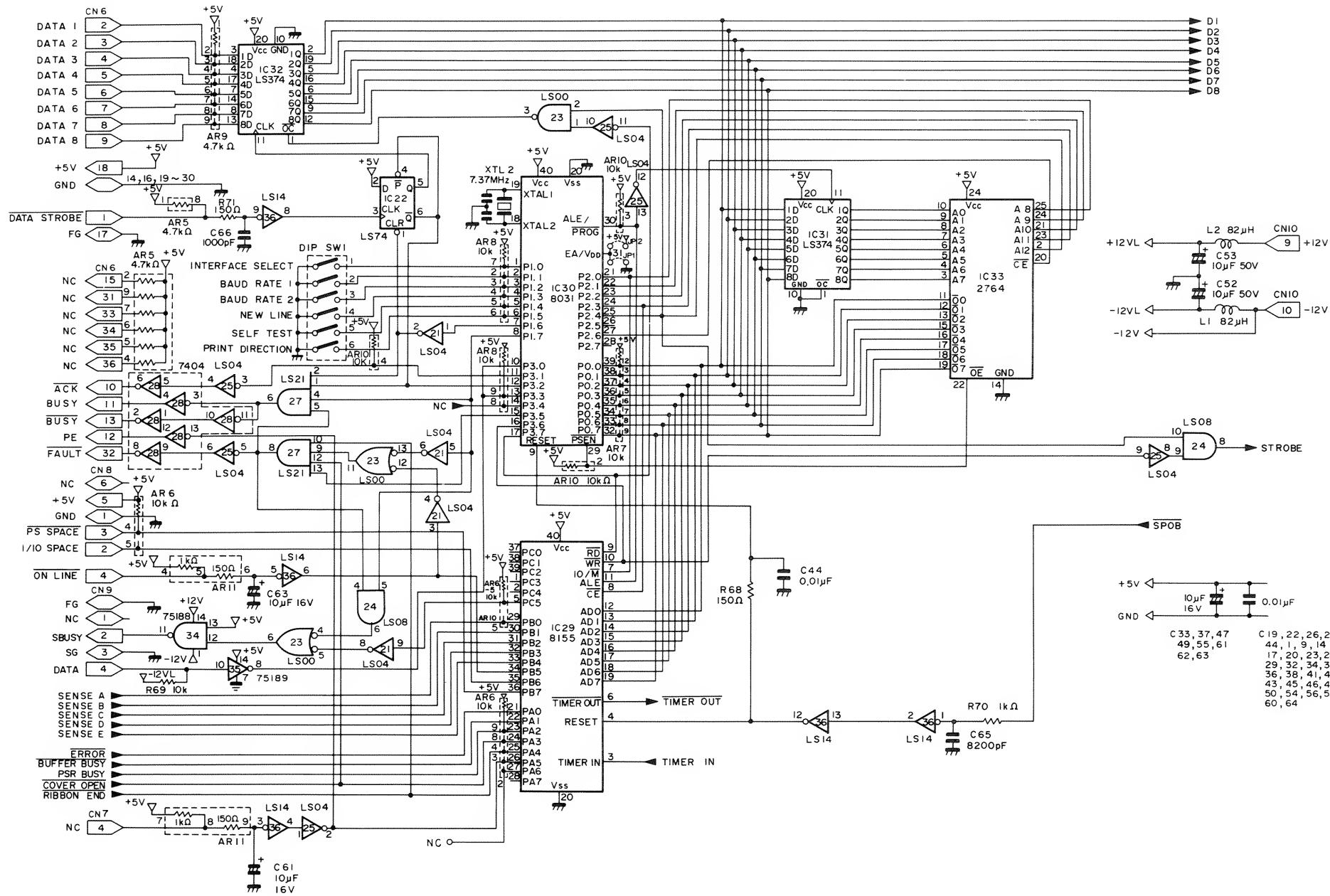
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
0123456789

US ASC Venezia (Proportional Space)

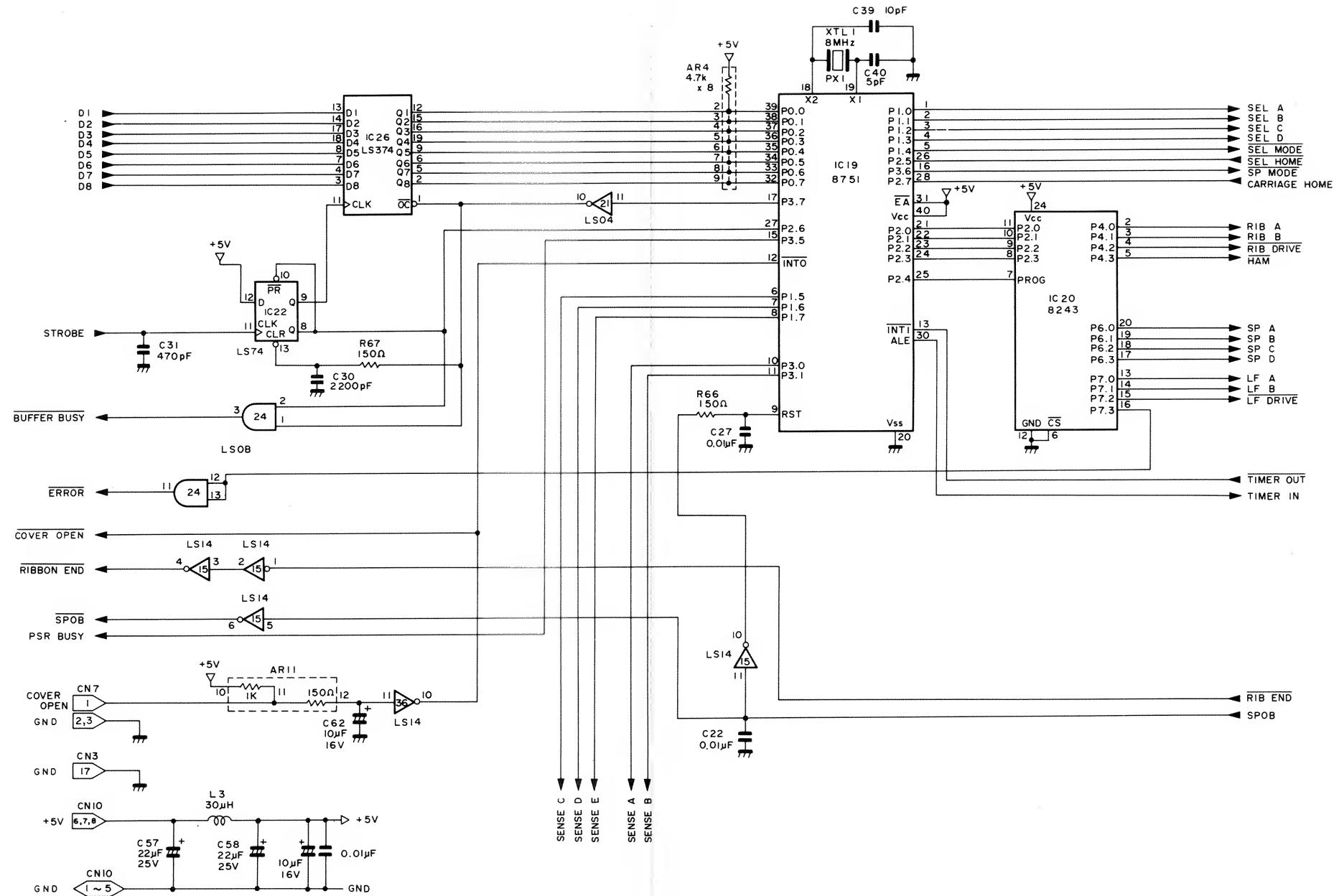
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
0123456789

Appendix D/ Schematic Diagrams

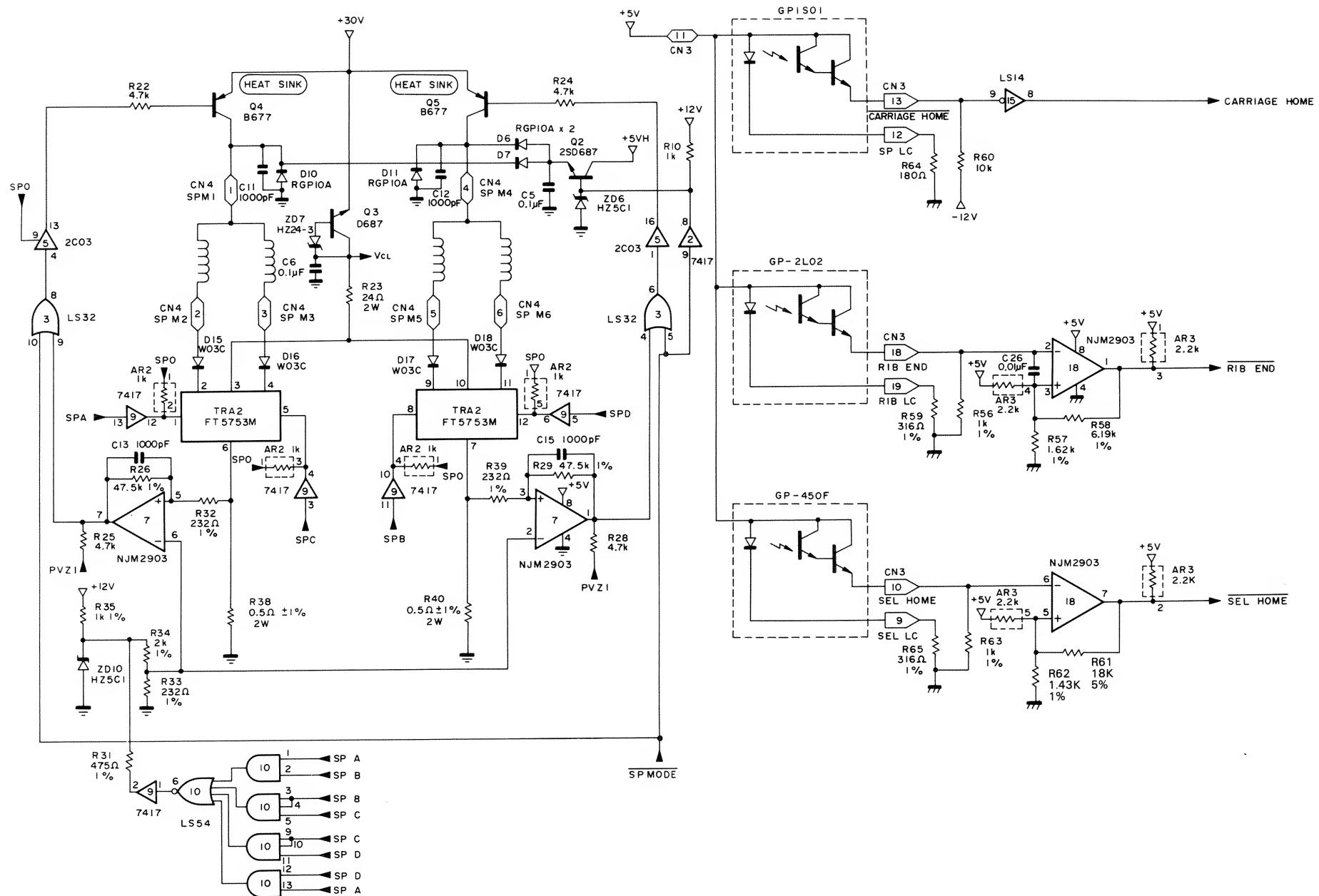
I/F Control Board Logic (Page 1 of 6)



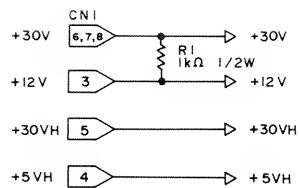
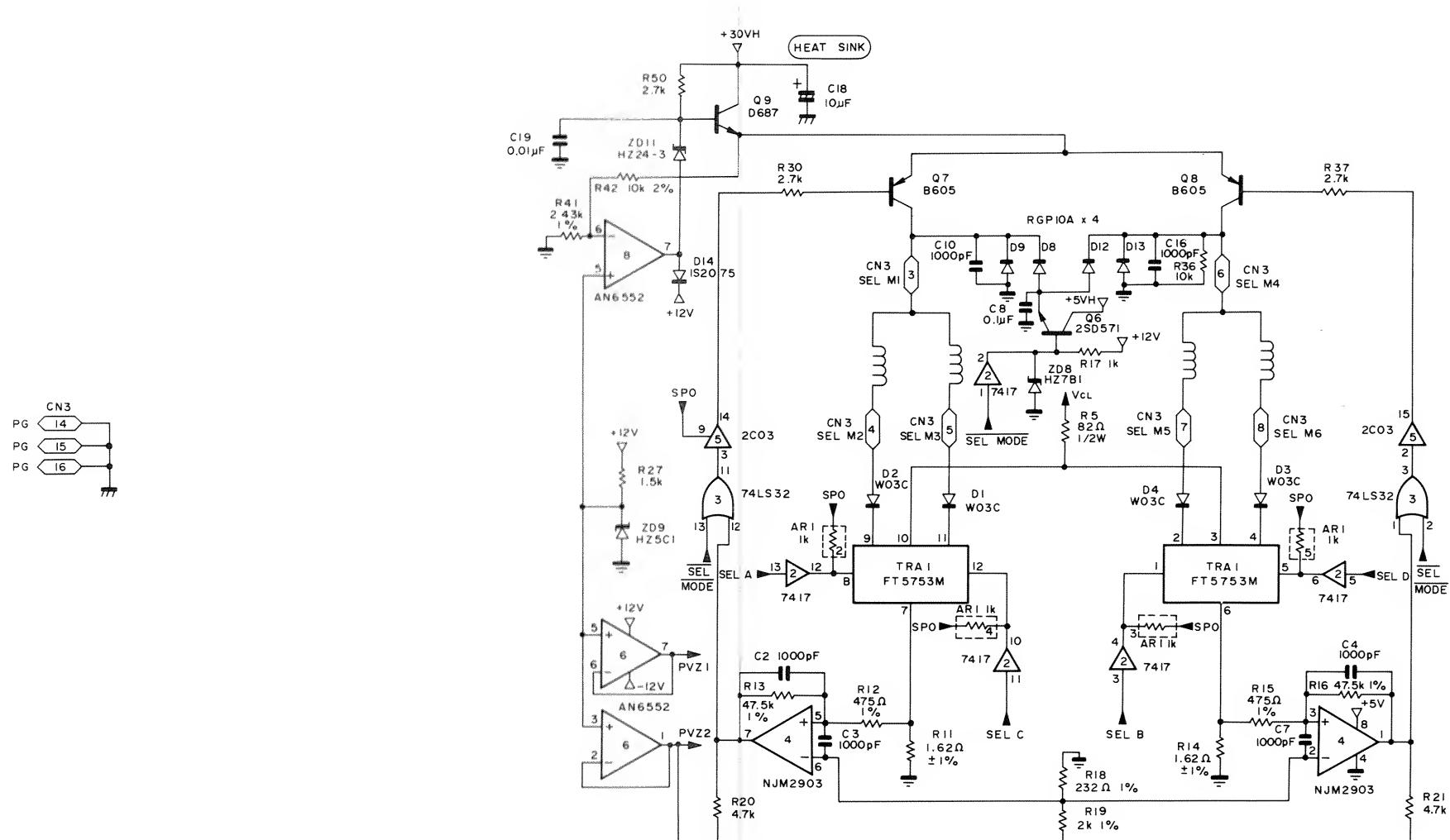
I/F Control Board Logic (Page 2 of 6)



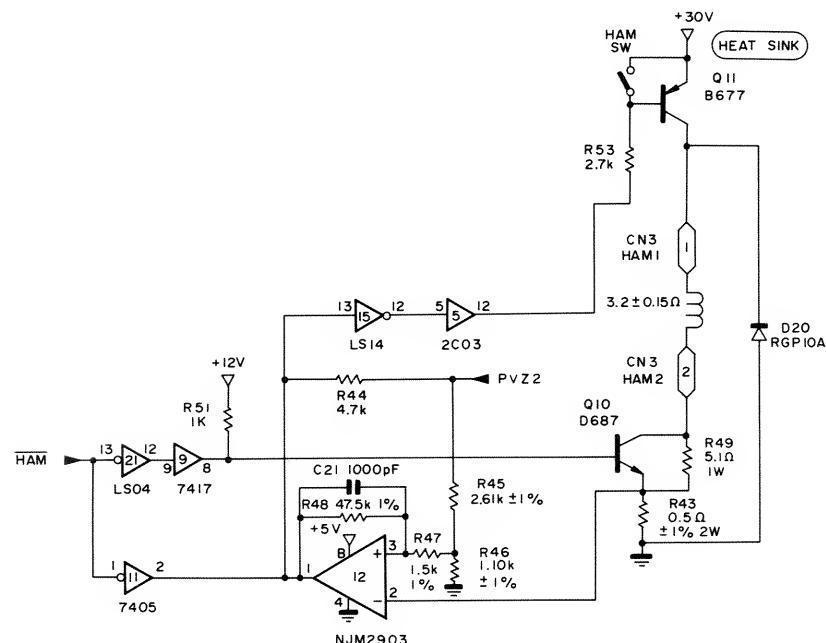
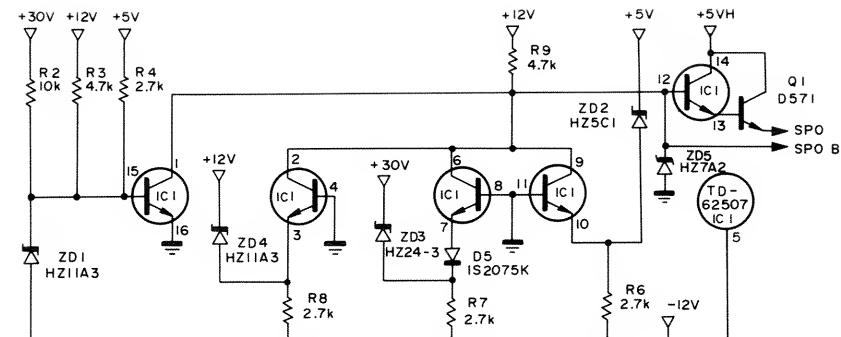
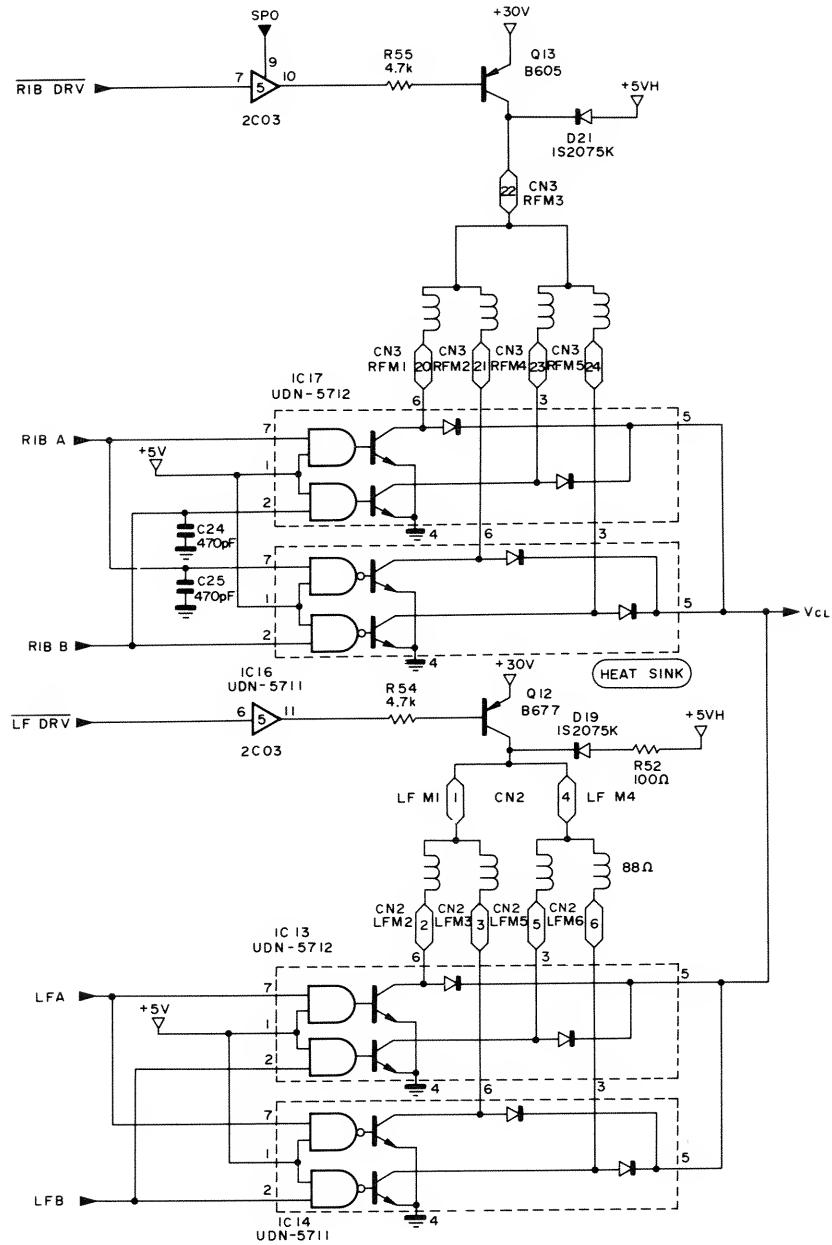
I/F Control Board Logic (Page 3 of 6)



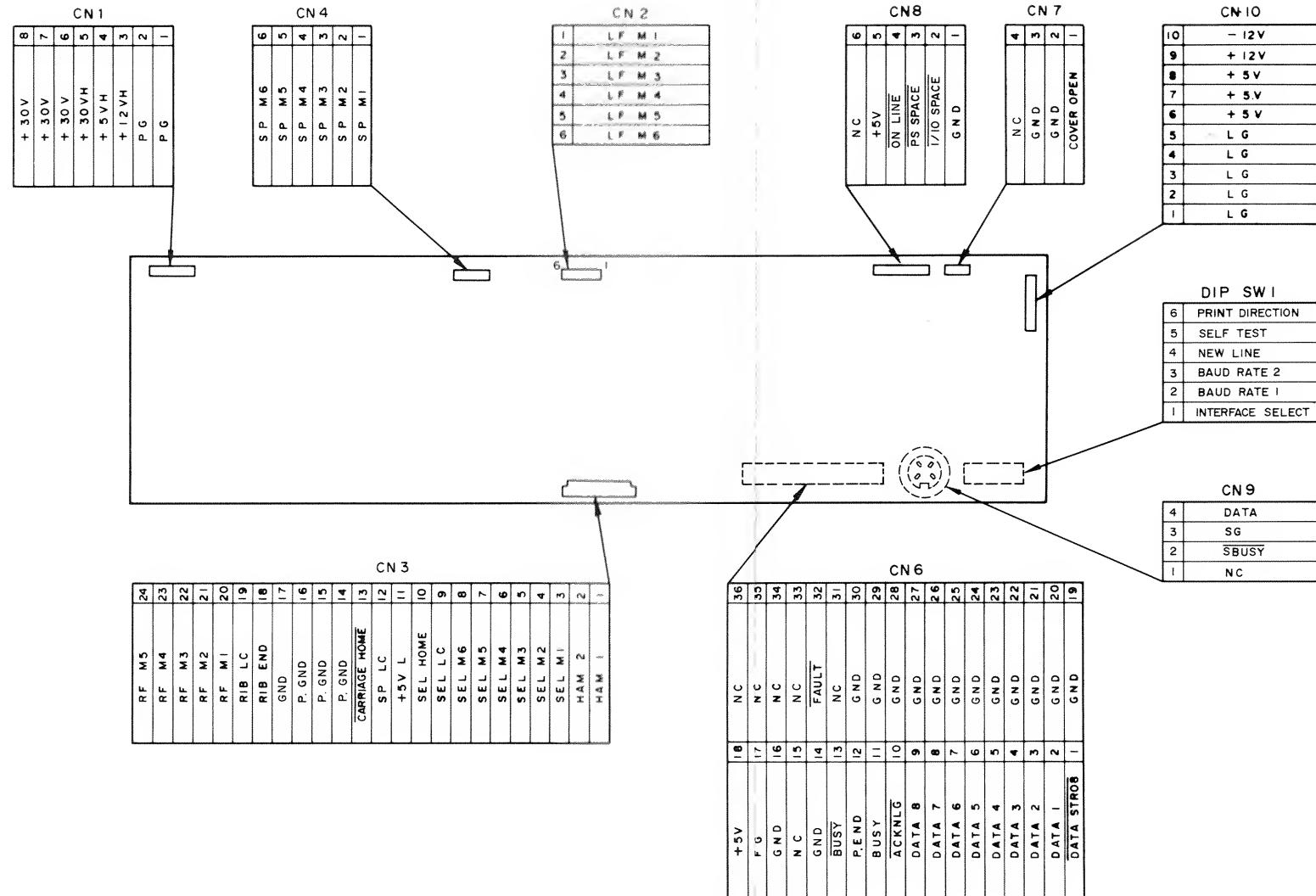
I/F Control Board Logic (Page 4 of 6)



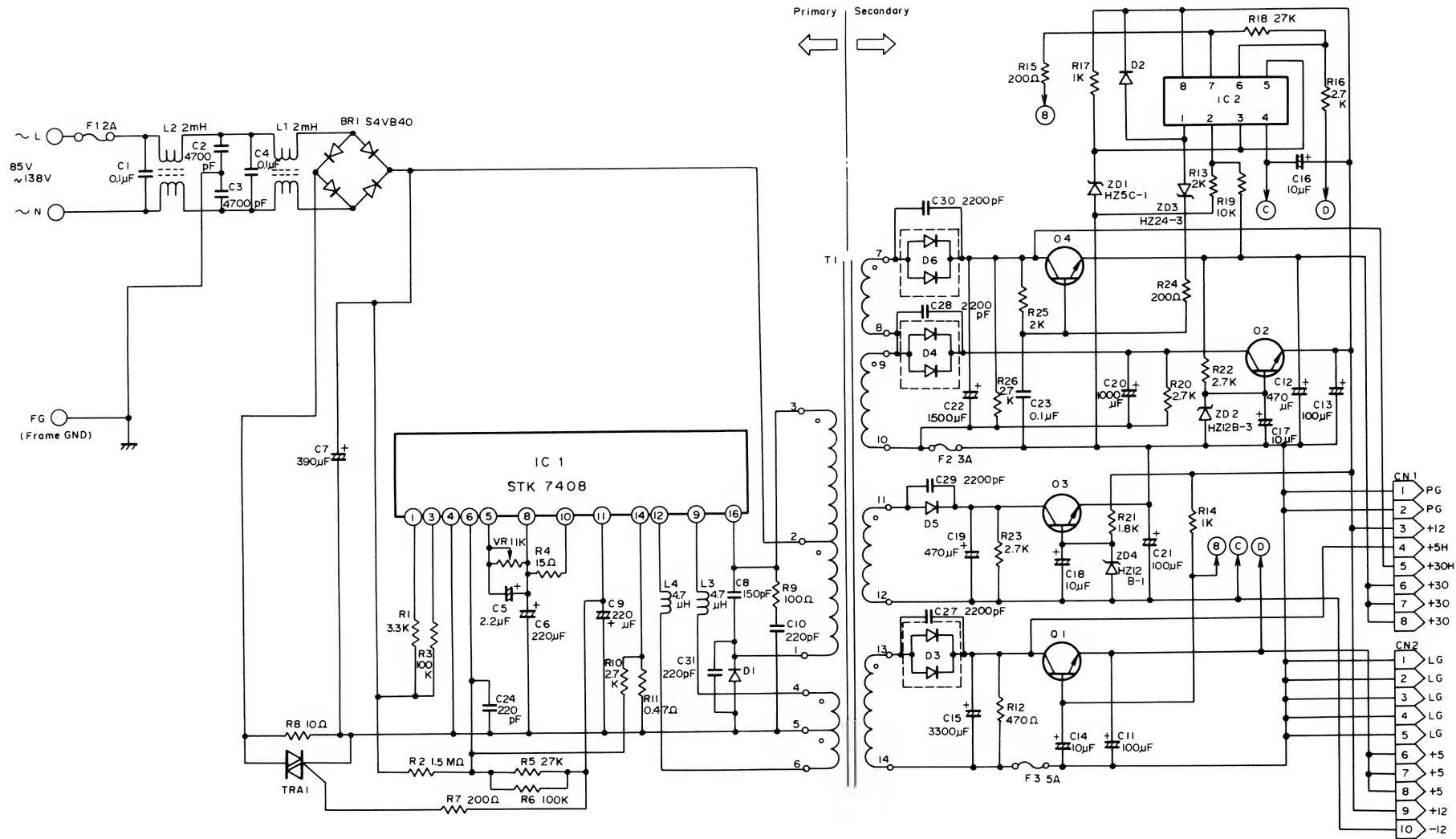
I/F Control Board Logic (Page 5 of 6)



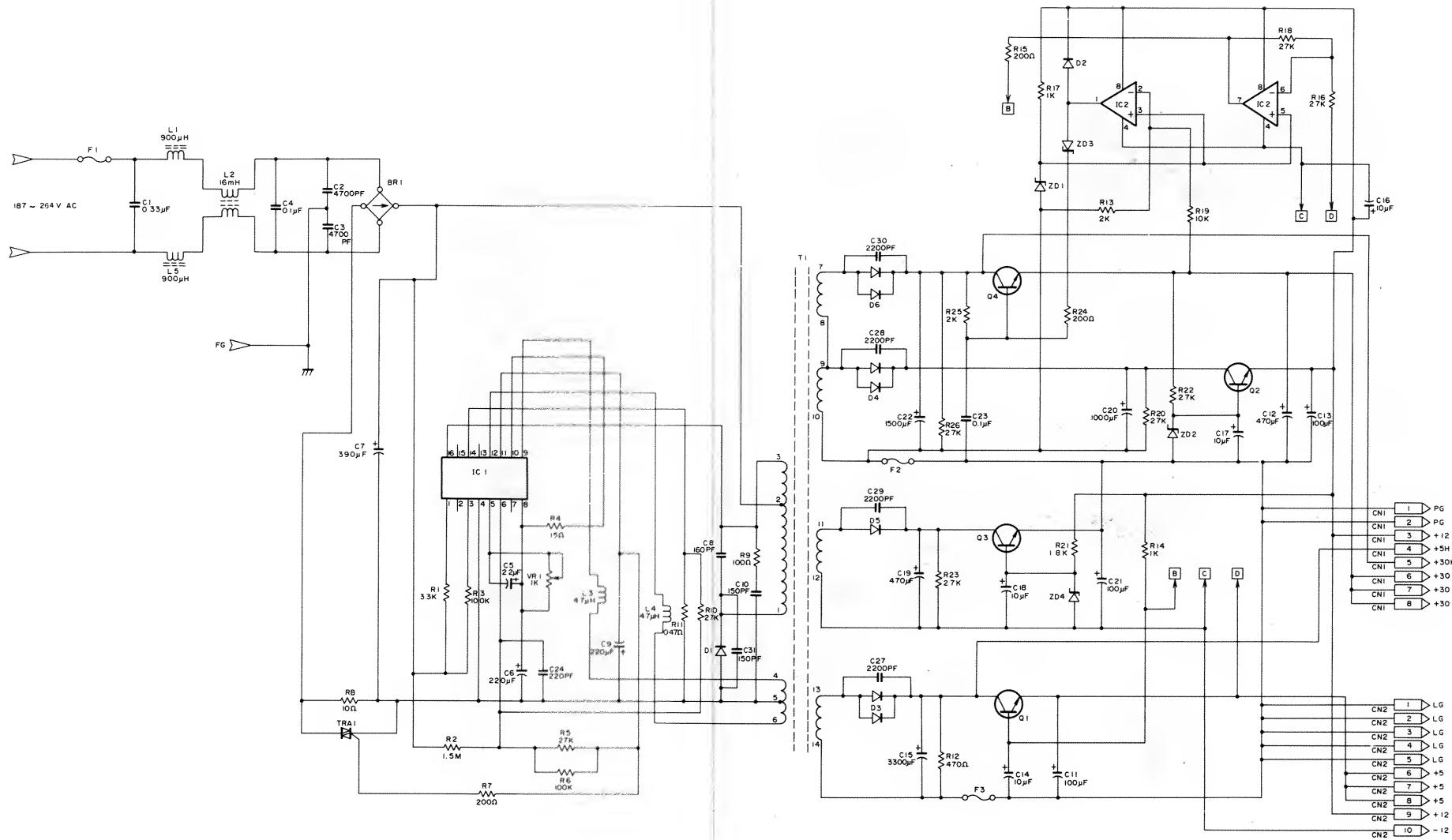
I/F Control Board Logic (Page 6 of 6)



Power Supply Unit Logic (100 Volt Series)



Power Supply Unit Logic (200 Volt Series)



SERVICE POLICY

Radio Shack's nationwide network of service facilities provides quick, convenient, and reliable repair services for all of its computer products, in most instances. Warranty service will be performed in accordance with Radio Shack's Limited Warranty. Non-warranty service will be provided at reasonable parts and labor costs.

Because of the sensitivity of computer equipment, and the problems which can result from improper servicing, the following limitations also apply to the services offered by Radio Shack:

1. If any of the warranty seals on any Radio Shack computer products are broken, Radio Shack reserves the right to refuse to service the equipment or to void any remaining warranty on the equipment.
2. If any Radio Shack computer equipment has been modified so that it is not within manufacturer's specifications, including, but not limited to, the installation of any non-Radio Shack parts, components, or replacement boards, then Radio Shack reserves the right to refuse to service the equipment, void any remaining warranty, remove and replace any non-Radio Shack part found in the equipment, and perform whatever modifications are necessary to return the equipment to original factory manufacturer's specifications.
3. The cost for the labor and parts required to return the Radio Shack computer equipment to original manufacturer's specifications will be charged to the customer in addition to the normal repair charge.

**CUSTOM MANUFACTURED FOR RADIO SHACK,
A DIVISION OF TANDY CORPORATION**

**U.S.A.: FORT WORTH, TEXAS 76102
CANADA: BARRIE, ONTARIO L4M 4W5**

TANDY CORPORATION

AUSTRALIA

91 KURRAJONG AVENUE
MOUNT DRAUITT, N.S.W. 2770

BELGIUM

PARC INDUSTRIEL DE NANINNE
5140 NANINNE

U.K.

BILSTON ROAD WEDNESBURY
WEST MIDLANDS WS10 7JN